Timely Topic: Soil Acidification Video

July 2020. Produced by Clain Jones, Montana State University Extension Soil Fertility Specialist

Some farmers on Montana's traditionally high pH soils are experiencing heavy yield losses due to the acidification of the top few inches of soil. At first, identifying the cause of poor crop growth has been a challenge, but now, the answer may come as quickly as doing a soil pH test in the field. "Soil acidification is an emerging issue in the state, where low soil pH has traditionally not been a concern," said Clain Jones MSU Extension's soil fertility specialist. Soil pH levels low enough to harm crop growth have been found in 24 Montana counties.

A new video (https://youtu.be/cjWneDQVyV8) shows the impact and causes of soil acidification and offers management options to prevent, adapt to, or correct acidic soil. The video was produced by Jones and Nate Kenney, a MSU filmmaking graduate student, and features a Fort Benton farmer collaborating with MSU scientists on this issue.

Acidity is measured on the pH scale. It goes from 0 to 14, with lower numbers being more acidic. When pH drops below 6, legumes have trouble fixing nitrogen, and there is change in herbicide action and how long herbicide residue stays in the soil. As pH goes below 5, aluminum that exists naturally in soil is released and can be taken up by plants, damaging crops.

Research by MSU soils professor Rick Engel, Jones, and others indicates that ammonium fertilizers, including urea, are the major cause of soil acidification in agricultural soils. Acidification can be hard to detect, since it can begin in a small area or be isolated to particular soil depths. That means that acidic soil can be hidden in standard soil test results. Jones said that soils tend to become acidic fairly quickly, even with the recommended levels of fertilizer use. This means it's not a question of if, but when, this problem will affect a specific, cropped and fertilized field.

Liming and manure applications are the primary long-term fixes for acidic soil, which will allow continued crop production. When using spent sugar beet lime, this can cost around $100/acre because of hauling and application costs, for a 15-20 year benefit. Based on personal experience, the Fort Benton farmer strongly encourages others to use prevention practices to avoid the expense and task of liming and to avoid yield losses.

Selecting crops that use less nitrogen, such as legumes and barley, and applying nitrogen fertilizer in ways that maximize the amount take up by plants, can slow the downward slide to low pH. Some crops and varieties are more tolerant of low pH, and perennials may slowly increase soil pH.

Engel's research, funded by the Montana Fertilizer Advisory Committee and a U.S. Department of Agriculture Western Sustainable Agriculture Research and Education grant, also found that seed-placed phosphorus fertilizer can help crops tolerate high soil aluminum levels caused by low pH. But this is a short-term adaptation, not a long-term solution, said Jones.

The video is available to view at https://www.youtube.com/watch?v=cjWneDQVyV8&feature=youtu.be.

For additional information, visit http://landresources.montana.edu/soilfertility/acidif/index.html or contact Jones at clainj@montana.edu or 406-994-6076.